

## ABSTRACT

Title of Thesis: AFFECTIVE REACTIONS TO  
UNCERTAINTY AS DRIVEN BY PAST  
EXPERIENCES, PERSONALITY, AND  
PERCEIVED VALENCE

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The assumption that uncertainty is inherently threatening which underlies decades of research belies the fact that people rarely react negatively to uncertain situations about which they do not care, and that some are excited by uncertainty. I propose that affective reactions to uncertainty are driven not by uncertainty itself, but by people's expectations of positive and negative outcomes to personally relevant uncertain situations. I find that positive past experiences predict higher optimism and higher resilience, both of which predict higher tolerance of uncertainty and more positive perceptions of uncertain events. I also find that negative past experiences predict higher pessimism and lower resilience, both of which predict higher intolerance of uncertainty and more negative perceptions of uncertain events. The second study suggests that optimistic people are more likely to approach, rather than avoid, uncertainty. The third study finds that mindfulness training, which emphasizes non-attachment to outcomes, results in more neutral reactions to uncertainty. Theoretical and practical implications are discussed.

AFFECTIVE REACTIONS TO UNCERTAINTY AS DRIVEN BY PAST  
EXPERIENCES, PERSONALITY, AND PERCEIVED VALENCE

by

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## Dedication

To my parents, on whom I cannot blame my own intolerance of uncertainty. Thank you for all your warmth, involvement, and autonomy support. I love you.

## Acknowledgements

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## Introduction

Aaron, a young man who grew up in Boston, was nervous for his first day of work at a national non-profit organization in New York City. Asked why, he responds frankly, “I hate the first time doing anything.” Going into new, uncertain situations, whether the first day of school or work, a first date, or even the first meeting with a new doctor, fills Aaron with dread. The possibility that he will fail in his job, turn off his date, or be scammed or mistreated by a healthcare provider invades his mind, crowding out any hope for success in his career, a fulfilling romantic relationship, or an improvement in his quality of life. Given his self-described “hatred” of the unknown, it may surprise one to find out that Aaron loves gambling. Unlike others his age who might enjoy partying and consuming large amounts of alcohol, or hanging out with friends while smoking marijuana, Aaron explains, “Gambling is my main vice.” At only 24 years old, Aaron has already traveled to Las Vegas from the East Coast for the purpose of gambling and regularly engages in sports betting and other such activities whenever he travels to a state in which doing so is legal. There is one exception to his love of gambling, however: “I never bet against a Boston team.”

Why is it that Aaron loathes uncertainty in his personal life but chooses to engage in an inherently uncertain activity in his free time? The answer might be the same as the reason why he never bets against a Boston team. When the uncertain situation is personally salient to Aaron, he expects and fears the worst outcomes, in part due to his history of negative experiences, including his parents’ contentious divorce and subsequent mistreatment by other adults charged with helping him

through that childhood trauma. Being from Boston, Aaron is too personally invested in the athletic outcomes for Boston teams to enjoy gambling on their success. But when the uncertainty does not matter to him (he never bets an amount of money which would lead to financial struggles if he lost it), Aaron enjoys the thrill of not knowing.

Most psychological research on uncertainty has focused on its negative aspects and assumed an innate desire to avoid it. Yet research has also recognized individual differences in reactions to uncertainty, suggesting that it is not equally aversive to all persons, and allowing that some people may enjoy the thrill of exploring an uncertain situation. What is less clear is what determines people's reactions to uncertainty, and whether it is truly uncertainty as such that elicits these reactions, or whether these are elicited by the negative or positive outcomes that people associate with uncertainty. It is possible that expectations of positive and negative outcomes to uncertain situations is what determines people's affective reactions to uncertainty. Numerous theories from across varying psychological fields suggest that optimism and pessimism, as well as general emotional reactions to environmental stimuli are partially determined by people's past experiences (e.g., Barrett, 2017). Moreover, the magnitude and perceived importance of potential outcomes may also contribute to people's affective reactions; hence, Aaron's enjoyment of sports betting as long as a Boston team is not involved. If this is indeed the case, then Buddhist-inspired mindfulness meditation practice should reduce the perceived magnitude of outcomes and correspondingly, the degree of affective responses to uncertainty.

### Negativity Bias in Uncertainty Research

The negativity bias in uncertainty research refers to the underlying assumption that uncertainty is inherently frightening or stressful. Tversky and Kahneman (1974) proposed that, under conditions of uncertainty, individuals rely on cognitive shortcuts – heuristics – which allow them to avoid calculating complex probabilities and making predictions based on limited information. Rather, in uncertain situations, people calculate subjective probabilities using the representativeness, availability, and anchoring and adjustment heuristics, which are simultaneously practically useful and systematically biased. According to Ellsberg (1961), people’s aversion to uncertainty so dominates their cognitive processes that they would prefer to make a risky decision, knowing for certain that they are likely to lose, than to make a decision under uncertainty. Within the field of personality psychology, Hogg’s (2007) Uncertainty-Identity Theory holds that “feelings of uncertainty, particularly about or related to self, motivate people to identify with social groups and to choose new groups with, or configure existing groups to have, certain properties that best reduce, control, or protect from feelings of uncertainty” (p. 69). The effect of self-uncertainty has also been found among undergraduate research participants who demonstrated “compensatory conviction” – zealotry regarding aspects of themselves and social issues about which they cared – when they were feeling uncertain about completely unrelated aspects of themselves (McGregor & Marigold, 2003). In the field of cross-cultural psychology, Hofstede (2001) proposed that uncertainty avoidance was a key psychological dimension by which cultures can be described. Hofstede’s uncertainty

avoidance dimension specifically refers to “the level of stress in a society in the face of an unknown *future* [emphasis added]” (Hofstede, 2011, p. 8).

The negativity bias in the research literature on uncertainty is clear and has dominated the field for decades. The negative consequences of intolerance of uncertainty, from authoritarianism (e.g., Adorno et al., 1950) to obsessive-compulsive disorder [OCD] (e.g., Tolin et al., 2003), have been explored in depth, but this research is predicated on the assumption that uncertainty is innately threatening, albeit to varying degrees. Research has rarely explored why some people may find uncertainty more tolerable than others and whether it is really uncertainty itself that is fear-inducing, or if it is rather the expectation of negative outcomes in uncertain situations which produces such dread. The present research aims to fill this gap.

#### *Determinants of Reactions to Uncertainty*

The negativity bias in the uncertainty literature is consistent with the notion that intolerance of uncertainty is evolutionarily (Brosschot, Verkuil, & Thayer, 2016; Carleton, 2016) and developmentally (Oesterreich, 2005) adaptive. The literature largely does not address, however, whether *tolerance* for uncertainty may also be naturally occurring, and whether perceiving uncertainty as something positive to be approached, rather than something negative to be avoided is possible. Sorrentino and Short (1986) hinted at this possibility with their conceptualization of an “uncertainty orientation,” in which people are motivated to succeed in situations which are marked by uncertainty, whereas those with a “certainty orientation” are motivated to remain in comfortable, familiar situations. However, Sorrentino and Short (1986) maintain that the uncertainty orientation is consistent with Kagan’s (1972) statement that

resolving uncertainty is a primary motivation, as is Rokeach's (1960) characterization of open-minded people as being unafraid of confronting uncertainty in order to resolve it, as opposed to closed-minded people, who avoid uncertainty altogether. All three of these theories maintain that even though some people are less afraid of uncertainty than others, certainty is always the ultimate goal.

It is of interest that some of the earliest research on intolerance of uncertainty pushes back on the assumption that intolerance of uncertainty is natural and necessary for survival, and instead holds that it is maladaptive and can have dire consequences. Intolerance of uncertainty at the individual level was first highlighted by the research team of Sanford, Adorno, Frenkel-Brunswik, and Levinson (1950). The team, in measuring prejudicial opinions after the end of the Second World War, began to suspect that antisemitism and ethnocentrism were more than opinions; they were features of an underlying personality disposition. Their F Scale, intended to measure "implicit prefascist tendencies" (p. 224), includes items measuring adherence to conventional values, submission to authoritarian leaders, aggression against those who violate conventional values, opposition to imagination and open-mindedness, stereotyping and superstitiousness, importance of dominance and strength, general hostility toward others, belief in a dangerous world, and preoccupation with sexual deviance (Sanford et al., 1950). Across these variables, the researchers maintain that intolerance of ambiguity is a hallmark feature of the authoritarian personality (Adorno et al., 1950), which is viewed as an essentially maladaptive if not pathological personality configuration.

Thus, the vast literature on reactions to uncertainty reveals that avoidance-related reactions are not necessarily universal and are often considered maladaptive when present at a high level. Yet, little research sheds light on the factors that contribute to intolerance of uncertainty. Upon closer examination, the fact that there are individual differences in people's reactions to uncertainty belies the notion that people invariably find uncertainty aversive, which begs the question of the determinants of affective reactions to uncertainty.

#### Effects of Past Experiences on Affective Reactions to Uncertainty

Past experiences can impact one's reactions to and perceptions of uncertainty in myriad ways. One prominent theme in the literature on intolerance of uncertainty is the relationship between attachment, which is derived from past experiences in the form of care in infancy and early childhood, and the ability to cope with uncertainty. A key factor in the relationship between attachment and intolerance of uncertainty is exploration (Bowlby, 1969). Mary Ainsworth and colleagues (1978) described two features of a healthy caregiver-child relationship: The child uses the caregiver as a secure base from which to explore a new environment and learn how to function in it safely, and the caregiver also provides the child with a safe haven to which they can return when in distress. When the caregiver acts as both secure base and safe haven, the child is said to be securely attached. Such an attachment style arises from consistent and responsive caregiving. In contrast, inconsistent caregiving gives rise to anxious/ambivalent attachment – these infants are unable to explore an uncertain environment because they are not confident about the availability of their secure base. Finally, consistently neglecting or rejecting caregiving gives rise to avoidant

attachment – these infants explore their environments “devoid of true interest, as the child defensively tries to cope with the perceived unavailability of a secure base” (Elliot & Reis, 2003, p. 317). Both anxious/ambivalent and avoidant attachment styles may be referred to as insecure.

In adult relationships, anxiously attached people are needy and jealous, and avoidantly attached people may have many casual relationships without serious commitment. Outside of romantic relationships, securely attached adults have also been shown to have a higher need for achievement and lower fear of failure than insecurely attached adults (Elliot & Reis, 2003). Similarly, adolescents who participated in a psycho-educational program focused on increasing security of attachments demonstrated lower intolerance of uncertainty and subsequently less academic procrastination than adolescents who did not (Yildiz & Iskender, 2021). Each of these cases suggests that securely attached adults are more willing to wade into the unknown in order to promote themselves, whereas insecurely attached adults are more focused on preventing the negative outcomes that may result from uncertain situations. The “secure base” theory has also been examined with attachment figures other than caregivers; Christian college students who perceived God to be a secure base demonstrated more theological and spiritual exploration than those who were not securely attached to God. Whereas participants who were avoidantly attached to God did not demonstrate exploration, they were also more likely to reject the core tenets of Christianity. In contrast, participants who were anxiously attached to God did not demonstrate exploration and were also less tolerant of Christian faiths different from their own, demonstrating a sort of clinginess in their attachment to God (Beck, 2006).

These findings all suggest that the lower intolerance of uncertainty associated with secure attachment is related to securely attached individuals' higher comfort level in new, challenging situations.

Beyond infancy and the close interpersonal relationships which mold a young child's development, there are also a number of experiences which can occur throughout childhood and adolescence which can shape individuals' views of the world. The publication of the adverse childhood experiences [ACEs] study was a watershed event in the fields of both psychological and medical research. The original study drew links between ten ACEs (emotional and physical neglect; emotional, physical, and sexual abuse; parental divorce; violence against the mother; and having household members struggling with substance abuse, mental illness, or incarceration) and varying degrees of increased risk for alcoholism, drug abuse, depression, suicide attempts, sexually transmitted disease, obesity, heart disease, lung disease, liver disease, cancer, and other negative physical and mental health outcomes (Felitti et al., 1998). A later study adjusted the ACEs in order to correct for biases and better capture the experiences of minority communities in addition to those of the largely Caucasian, middle-class sample used in the original study, resulting in a list of 14 "expanded" ACEs: Emotional and physical neglect; emotional, physical, and sexual abuse; domestic violence in the household; having household members struggling with substance abuse, mental illness, or incarceration; living in an unsafe neighborhood; witnessing community violence; experiencing discrimination; being bullied; and living in foster care (Cronbach et al., 2015). Expanded ACE scores have been found to be associated with substance abuse and sexually transmitted infections

(Wade et al., 2016), unhealthy lifestyles (Ogden, Forke, & Cronholm, 2019), asthma (Barnthouse & Jones, 2019), and gang involvement (Wolff et al., 2020). Notably, ACEs have also been found to predict lower levels of cognitive flexibility, which is related to intolerance of uncertainty (Kalia & Knauft, 2020). Research has yet to explore the potential link between ACEs and affective reactions to uncertainty, however.

As attested to by the varied streams of research reviewed above, people vary in their affective reactions to uncertainty, which are largely impacted by past experiences. There are several possible reasons why people with more positive past experiences might have a higher tolerance for uncertainty. It is possible that more positive memories lead people to expect more positive outcomes in uncertain situations. This is consistent with the availability heuristic, which holds that people overestimate the frequency of events which are more accessible to them (Tversky & Kahneman, 1973). This concept is closely tied to that of chronic accessibility (Higgins & King, 1981), which holds that “the accessibility, or ease of activation, of a construct representing a category of social behavior (e.g., kindness, selfishness, honesty) is assumed to increase the more frequently it is used in interpreting the behavior of oneself and others” (Bargh & Pratto, 1986, p. 295). For example, if one has frequently experienced unkindness and threatening behavior from others, including parents and caregivers, they may be more likely to interpret ambiguous interpersonal interactions as threatening (Constans et al., 1999), perhaps because people use their past experiences to compensate for a lack of information in uncertain situations (Higgins & Brendl, 1995).

Erev and colleagues (2020) compared the effect of recently experienced outcomes to that of a long-term history of outcomes. Through a series of experiments using a gambling-style “clicking paradigm,” these researchers found that when people have not experienced a negative outcome in the previous five trials, they underweight the likelihood of that outcome, even when provided with information which implies the objective (long-term) probability of the negative outcome. However, when people have experienced the negative outcome, they overweight the likelihood of that outcome, even when given the exact same information. This finding is consistent with the “hot hand” effect in basketball: even though objective probability and extensive statistical analyses hold that a basketball player is not more likely to hit a free throw after a hit than after a miss, fans and players alike nevertheless believe that it is so. Thus, they base their probability estimates of hitting a free throw on immediate past experience, rather than a player’s overall hit percentage over his or her career (Gilovich, Vallone, & Tversky, 1985).

This effect of past experience on interpretation of uncertainty has also been supported experimentally with regard to short-term accessibility. For example, participants primed with sentences related to a secure attachment style were significantly more willing to explore new environments than were participants primed with sentences related to an anxious attachment style, but not those primed with sentences related to an avoidant attachment style (Green & Campbell, 2000). The synapse model (Higgins, Bargh, & Lombardi, 1985; Higgins, 1989; Higgins & Brendl, 1995) proposes that both a frequently primed construct – that which is chronically accessible – and a recently primed (situational or contextual) construct

must reach a particular threshold of activation in order to play a role in the interpretation of a stimulus. The chronically accessible construct decays relatively slowly given how frequently it is activated, but it has also begun to decay at the time that the contextually accessible construct is activated. Thus, in the immediate term, the contextually accessible construct will dominate stimulus interpretation. However, given how quickly and sharply the contextually primed construct decays, it is the chronically accessible construct which will dominate long-term stimulus interpretation.

#### Personality Correlates of Affective Reactions to Uncertainty

Some of the cognitive mechanisms by which past experiences can inform affective reactions to uncertainty are described above. In addition to those mechanisms, past experiences, both positive and negative, can impact personality traits which may in turn affect the ways that people perceive and react to uncertain situations. As expressed above, positive past experiences can lead people to expect positive outcomes in uncertain situations, and this expectation may be interpreted as optimism. Conversely, negative past experiences can lead people to be more pessimistic and expect negative outcomes in uncertain situations. Optimism and pessimism have been researched extensively, albeit rarely as they relate to the affective reactions to uncertainty. It is plausible to speculate, however, that optimists may have a higher tolerance for uncertainty, because they believe that uncertain situations are likely to have positive outcomes. Interestingly, optimism has been found to be significantly and positively related to perceived control and to generalized self-efficacy, perhaps indicating that optimists may be more comfortable with

uncertainty because they have confidence in their own abilities to bring about a positive outcome (Alarcon, Bowling, & Khazon, 2013). This is consistent with the idea that intolerance of uncertainty arises from maladaptive or unadvanced coping skills (Brosschot, Verkuil, & Thayer, 2016), possibly resulting from a history of failures. However, if intolerance of uncertainty is indeed based on expectations of negative outcomes and not on uncertainty as such, then there could be a positive connection between optimism/pessimism and tolerance/intolerance of uncertainty. A hallmark of positive psychology is the idea of “learned optimism” and the idea that people can be taught strategies to expect more positive outcomes in their lives (Seligman, 2006). If so, there could be ways of reducing people’s negative affect toward uncertainty via optimism training. These possibilities could be explored in future research.

As previously noted, positive reactions to uncertainty may be linked to feelings of self-efficacy, arising from histories of positive outcomes, optimistic personalities, or both. This finding would indicate that people who feel positively about uncertainty feel that way because they believe that they can bring about a positive outcome. There are many uncertain situations, however, in which the outcome is beyond one’s control. In these cases, positive reactions to uncertainty may be driven not by feelings of self-efficacy but rather by resilience – the belief that one will be able to recover from a negative outcome should it occur (Herman et al., 2011). In this way, resilience may be conceived as a counterpart to optimism in which optimism is the expectation that good things will occur, and resilience is the expectation that one will be able to deal with bad things when they occur. Indeed,

resilience has been found to be a protective factor in numerous studies on the effects of ACEs (e.g., Poole, Dobson, & Pusch, 2017; Ross et al., 2020; Leung, Chan, & Ho, 2022). Resilience has also been found to be negatively associated with intolerance of uncertainty (Lee, 2019; Saricam, Deveci, & Ahmetoglu, 2020).

### *Perceived Valence of Outcomes Expected in Uncertain Situations*

Thus far, the described research has been concerned with the way that expectation of positive and negative outcomes, as well as expectation of one's ability to deal with potential outcomes, impacts people's affective reactions to uncertainty. Yet, this assumes that an individual cares about this expected positive or negative outcome; if they did not, they would not react emotionally to the uncertainty itself. One might consider an upcoming election in one's own country versus one in a country far away. Although the level of uncertainty might be the same, someone who is intolerant of uncertainty is likely to be far more anxious and stressed about the former since the anticipated negative outcome of such an uncertain situation will have tangible impacts on their life. Even one with trait-level, even pathological, intolerance of uncertainty is unlikely to be mired in dread about the uncertain outcome of a political election in a country in which they do not live and about which they do not care. This aspect of reactions to uncertainty suggests that affective reactions to uncertainty, particularly maladaptive ones, can be ameliorated by lowering their valence.

## Mindfulness

One area of study relevant to expected outcomes in uncertain situations is mindfulness, “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003, p. 145). The operational definition of mindfulness consists of first, regulating one’s attention to focus only on immediate, present experiences and sensations, and second, approaching the present moment with “curiosity, openness, and acceptance” (Bishop et al., 2004, p. 232). The second part of the operational definition includes a focus on non-attachment to outcomes, which is derived in part from the Buddhist philosophy of letting go of one’s fixations on the outcomes of events and life changes, and rather viewing the world and reality as transient and impermanent (Ho, Ben, & Mak, 2022). Thus, emphasizing non-attachment to outcomes, a key facet of mindfulness meditation, should lead people to perceive uncertain events more neutrally, leading people with long-term positive experiences to react to the uncertainty less positively and people with long-term negative experiences to react to the uncertainty less negatively. Mindfulness meditation has been used as an intervention with non-clinical samples in order to decrease stress and increase wellbeing in general (Flett et al., 2019). In clinical samples, mindfulness-based cognitive therapy has also been used to target intolerance of uncertainty as a symptom of panic disorder (Kim et al., 2016). Lower intolerance of uncertainty has also been found to mediate the relationship between high levels of mindfulness and low levels of health anxiety among undergraduate students (Kraemer, O’Bryan, & McLeish, 2016).

### *The Present Research*

In light of the foregoing review, the present research is focused on the relation between (1) past history of positive/negative outcomes and (2) the perceived valence of (or degree of caring about) expected outcomes on affective responses to uncertain situations.

#### History of Outcomes

Specifically, I hypothesize that negative childhood experiences are associated with higher intolerance of uncertainty and that positive childhood experiences are associated with lower intolerance of uncertainty. The hypothesized association between positive/negative childhood experiences and tolerance/intolerance of uncertainty could be mediated by increased optimism/pessimism. In essence, people who have experienced generally positive outcomes in the past would be more likely to expect positive outcomes in the future. Indeed, although optimism is rarely explored as an outcome variable in the psychological literature, limited research has found that positive life events are associated with increased optimism in adulthood (Schwaba et al., 2019; Ek, Remes, & Sovio, 2004). It seems plausible that tolerance of uncertainty, driven by both positive experiences and expectations of positive outcomes should therefore lead people to explore uncertain situations with interest, rather than “seizing and freezing” on or fleeing into certainty (Kruglanski & Webster, 1996; Oesterreich, 2005). This hypothesis is supported by previous research which suggests that securely attached adults (predicted by positive childhood experiences with respect to parenting) are more open to novel experiences and people (Fraley &

Shaver, 2000), and that securely attached children display more exploratory behaviors (Hazen & Durrett, 1982).

#### Perceived Valence of Outcomes

Beyond the history of outcomes, and the degree of optimism/pessimism it may induce, I assume that mindfulness training may affect people's affective responses to uncertain situations. Specifically, because mindfulness induces the attitude of detachment, it should reduce the perceived valence of outcomes at stake in given uncertain situations. Thus, mindfulness training should lower the perceived positive valence of positive outcomes envisaged in an uncertain and also the perceived negative valence of negative outcomes in such situations. In other words, mindfulness training should reduce the optimists' positive affect experienced in uncertain situations while also reducing the pessimists' negative affect toward such situations. These notions were examined in three studies. Study 1 uses a correlational design to explore the relationship between long-term past negative events (i.e., adverse childhood experiences (ACEs)), long-term past positive events (i.e., perceptions of one's parents as warm, involved, and supportive of their autonomy), optimism, IU, and negative and positive perceptions of specific uncertain situations. Study 2 is an experiment which explores the relationship between long-term experiences, optimism, IU, and perceptions of uncertain situations, but also experimentally manipulates optimism. Finally, Study 3 is an experiment which explores the effects of long-term experiences on optimism, intolerance of uncertainty, and perceptions of uncertain situations, but uses mindfulness meditation training as an immediate prime

which would override the chronic accessibility effects of both negative and positive long-term past experiences on affective reactions to uncertain situations.

### Hypotheses

Based on the literature reviewed above, I propose four hypotheses to be explored in the present research: (a) a high number of adverse childhood experiences will predict a more negative perception of uncertain events, serially mediated by low optimism (i.e., pessimism) and a high intolerance of uncertainty; (b) high perceived parental involvement, autonomy support, and warmth during childhood will predict a more positive perception of uncertain events, serially mediated by high optimism and a low intolerance of uncertainty; (c) optimism training will lead to a more positive emotional reaction to uncertain events and thus an under-sensitivity and increased approach to risk; and that (d) mindfulness training will lead to a more neutral emotional reaction (neither positive nor negative) to uncertain events.

## Study 1

Study 1 used a correlational design and aimed at assessing the first two hypotheses. Based on the theory that affective reactions to uncertainty are derived not from the oft-assumed innate unpleasantness of uncertainty itself but rather from people's expectations of positive or negative outcomes to uncertain situations, the study measured whether such reactions could be predicted by three variables in a serial mediation model. People with more positive long-term experiences were predicted to expect more positive outcomes generally (i.e., be more optimistic), which in turn was expected to predict lower intolerance of uncertainty as a personality trait and subsequently more positive reactions to specific uncertain situations. Similarly, people with more negative long-term experiences were predicted to expect more negative outcomes generally (i.e., be less optimistic), which in turn was expected to predict higher intolerance of uncertainty as a personality trait and subsequently more negative reactions to specific uncertain situations, and they were expected to be less optimistic because they had more negative long-term experiences.

### Method

#### Participants

The participants in the first study included 400 American adults (45.3 percent cisgender female, 46.8 percent cisgender male) recruited through the online research platform Prolific. Ethnically, the participants were 67.5 percent white, 13.8 percent Hispanic/Latinx, 11.5 percent Black/African American, and 9.8 percent Asian. The mean and median ages reported by the participants were both 18.

## Materials

**Intolerance of Uncertainty Scale.** This scale is a 27-item questionnaire in which statements are rated on a Likert scale from one (“Not at all characteristic of me”) to five (“Entirely characteristic of me”). The scale measures four factors: “Uncertainty leads to the inability to act,” “Uncertainty is stressful and upsetting,” “Unexpected events are negative and should be avoided,” and “Being uncertain about the future is unfair.” A cumulative score is also calculated (Buhr & Dugas, 2002). For the present study, the Intolerance of Uncertainty Scale boasts excellent internal consistency ( $\alpha = 0.93$ ).

**Philadelphia Adverse Childhood Experiences Scale.** This scale includes 21 items assessing the presence of 14 sources of childhood adversity. The first nine sources of adversity were part of the original ACEs study (Felitti et al., 1998) and include emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, domestic violence in the household, substance abuse in the household, mental illness in the household, and incarcerated household member. The tenth source of adversity included in the initial ACEs study, parental divorce or separation, was excluded, given more recent research showing that the impacts of partnered and separated parental relationships are much more complex in diverse samples. The additional five sources of adversity occur at the community, rather than the household, level. They are witnessing violence in the community, feeling discrimination, living in an unsafe neighborhood, experiencing bullying, and living in foster care. The addition of these items was found to better identify adversities experienced by men, people of color, and working-class people than the original

ACEs, which were developed based on a sample of predominantly white, middle-class individuals (Cronholm et al., 2015). Given that the scale measures individual experiences which are not necessarily correlated with one another, calculating internal consistency was not appropriate.

Perceptions of Parents Scale. The 42-item college-student version of this scale assesses respondents' perceptions of each of their parents' autonomy support, involvement, and warmth, resulting in six subscale scores. An example of an item on the autonomy support scale is, "My mother, whenever possible, allows me to choose what to do." An example of an item on the involvement scale, which is reverse scored, is, "My father often seems too busy to attend to me." An example of an item on the warmth scale is, "My father makes me feel very special." All items are rated on a five-point Likert scale reflecting the extent to which they agree with each statement (Robbins, 1994). A pilot study of intolerance of uncertainty utilized this scale and computed an average score across both parents and all three aspects. For the present study, I amended the statements in the questionnaire so that they are written in past, rather than present tense. Doing so serves to make the scale parallel with the ACEs scale in that both will be retrospective and will also make the scale more relevant to a community sample of adults who may not presently have parents who are living or are actively engaged in their lives. Thus, the sample questions above read, "My mother, whenever possible, allowed me to choose what to do," "My father often seemed too busy to attend to me," and "My father made me feel very special." For the present study, the total score yielded acceptable internal consistency,  $\alpha = 0.77$ .

Perception of Uncertain Events. Participants were asked to rate the emotional tone of eight uncertain events on a scale from one (“totally negatively”) to seven (“totally positively”). For Study 1, these events were: A blind date, the first day of school, the birth of a new sibling, a job interview, a pop quiz, a game of Bingo, a swim in the ocean, and a haunted house. The total average score was computed and yielded moderate internal consistency,  $\alpha = 0.50$ . As will be described in more detail below, a principal components analysis resulted in the use of only the first day of school, a blind date, a job interview, the birth of a new sibling, a game of Bingo, and a pop quiz. This revised scale yielded similar internal consistency,  $\alpha = 0.482$ .

Brief Resilience Scale. The BRS (Smith et al., 2008) consists of six items rated on a five-point Likert scale, three of which are reverse-scored. Examples of items include “I tend to bounce back quickly after hard times” and “I have a hard time making it through stressful events.” This scale is positively correlated with other resilience measures, optimism, purpose in life, social support, active coping, and positive reframing, and is negatively correlated with pessimism, alexithymia, negative interactions, behavioral disengagement, denial, and self-blame. For the present study, the scale yielded good internal consistency, Cronbach’s  $\alpha = 0.81$ .

Life Orientation Test – Revised. The LOT-R (Glaesmer et al., 2012) consists of ten items rated on a five-point Likert scale: Three assessing optimism (e.g., “I’m always optimistic about my future”), three assessing pessimism (e.g., “If something can go wrong for me, it will), and four filler items (e.g., “It’s easy for me to relax”). Factor analysis of the LOT-R supports a two-factor model; for the present study,

Cronbach's  $\alpha = 0.71$  for the optimism subscale and  $\alpha = 0.74$  for the pessimism subscale.

General Self-Efficacy Scale. The NGSE (Chen, Gully, & Eden, 2001) consists of eight items rated on a five-point Likert scale. This scale measures “beliefs in one’s capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands” (Wood & Bandura, 1989, p. 408). Examples of items include “I will be able to achieve most of the goals that I have set for myself” and “When facing difficult tasks, I am certain that I will accomplish them.” The items on the NGSE have exhibited high content validity, defining general self-efficacy as “one’s estimate of one’s overall ability to perform successfully in a wide variety of achievement situations, or how *confident* one is that she or he can perform effectively across different tasks and situations.” The unidimensional scale has high internal consistency and is predictive of motivation and performance in workplace settings. For the present study, Cronbach’s  $\alpha = 0.91$ .

#### Procedure

For Study 1, a community sample of 400 participants was asked to respond to a series of questionnaires: The Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2002), the Philadelphia Adverse Childhood Experiences Scale (ACEs; Cronholm et al., 2015), the Perceptions of Parents Scale (POPS; Robbins, 1994), the Life Orientation Test – Revised (LOT-R; Glaesmer et al., 2012), the General Self-Efficacy Scale (NGSE; Chen, Gully, & Eden, 2001), and the Brief Resilience Scale (BRS; Smith et al., 2008). They were also asked to indicate the United States prevalence of each adverse childhood experience and to estimate the percentage of Americans who

have positive perceptions of their parents. Finally, they were asked to indicate the uncertainty and emotional salience of a series of eight situations: A blind date, the first day of school, the birth of a new sibling, a job interview, a pop quiz, a game of Bingo, a swim in the ocean, and a haunted house. Participants will be prompted to indicate how they would feel in reference to each situation on a scale from one (“totally negatively”) to seven (“totally positively”).

### Analyses

Descriptive statistics were calculated, as well as bivariate correlations, t-tests, and mediation models. All analyses were conducted using SPSS Version 26. Serial mediation was conducted using PROCESS Version 4.1. All of the mediation and serial mediation models use standardized z-scores for each variable. A post-hoc principal components analysis was conducted to differentiate between the items used in the perceptions of uncertain events scales in each of the three studies. Using an Oblimin rotation with Kaiser normalization in SPSS, I found that three components were extracted in each of the three studies. In the first study, the first component included: A blind date, the first day of school, and a job interview. The second component included: The birth of a new sibling, a pop quiz, a game of Bingo, and a swim in the ocean. The swim in the ocean also loaded relatively strongly (loadings of 0.545 vs. 0.321) onto the third component, which included the haunted house. For the second study, the first component included: The COVID-19 pandemic, a terror attack, an economic recession, a war, an undiagnosed illness. The second component included: A blind date, the first day of school, the birth of a new sibling, a job interview, and a pop quiz. The third component included: A game of Bingo, a swim

in the ocean, a haunted house, and a trip to a foreign country. The game of Bingo also loaded relatively strongly onto the second component (loadings of 0.451 vs. 0.230). For the third study, the first component included: The COVID-19 pandemic, a terrorist attack, an economic recession, a war, and an undiagnosed illness. The second component include: A blind date, the first day of school, the birth of a new sibling, a job interview, a pop quiz, and a game of Bingo. The third component included: A swim in the ocean, a haunted house, and a trip to a foreign country for the first time.

Therefore, with some minor variation, across all three studies, three components were revealed, with clear theoretical distinctions between them. The first component includes the events that I identified as being more objectively negative and with larger-scale consequences: The COVID-19 pandemic, a terrorist attack, a war, an undiagnosed illness, and an economic recession. The second component included six items which may be less obviously emotionally tinged but nevertheless apply to one's own life and outcomes either in the long-term (e.g., getting a job) or the short-term (e.g., winning at Bingo or acing a quiz): The first day of school, a blind date, a job interview, the birth of a new sibling, a game of Bingo, and a pop quiz. The third component included the final three items, which may be considered less personally relevant to the participants: A swim in the ocean, a haunted house, and a trip to a foreign country for the first time. Given the theory that people's negative and positive reactions are hypothesized to be based not on the uncertainty in and of itself but rather on people's past experiences, personality, and expectations of negative and positive outcomes, I decided to utilize only the second component in analyzing the data, in that these are all events that matter to people (as opposed to the events in the

third component), but that they were not so negative and on such a large scale as to potentially override people's initial interpretations of uncertainty and ambiguity (as opposed to the events in the first component). Under the definition of maximum uncertainty as a situation in which the outcomes are either unknown or equally probable, the components in the first component are also less uncertain than those in the second, because the outcomes of the former are more likely to be negative. In the vein of the categorizations of conceptualizations of uncertainty provided by Lipshitz and Strauss (1997), whereas the events in the first component are uncertain with regard to the amount of information one has, or the amount of understanding about the situation, the events in the second component are uncertain not only with regard to information, but also with regard to outcome.

### Results

The hypothesized serial mediation models were not supported. Specifically, number of ACEs was not significantly predictive of optimism ( $\beta = 0.0607, p = 0.2261$ ). However, ACEs was significantly positively predictive of IU, controlling for optimism ( $\beta = 0.1469, p < 0.05$ ), and IU was in turn significantly negatively predictive of perception of uncertain events ( $\beta = -0.2914, p < 0.001$ ). The direct effect of ACEs on perception of uncertain events was also significant ( $\beta = -0.1006, p < 0.05$ ). Thus, the simplified model excluding optimism entirely, wherein IU partially mediated the negative effect of ACEs on perception of uncertain events was significant, with an indirect effect of  $-0.0420$ , 95% CI  $[-0.0745, -0.0147]$ . This relationship is displayed in Figure 1.

[FIGURE 1 HERE]

The same model was run using POPS rather than ACEs as the independent variable, with parallel results. POPS was not significantly predictive of optimism ( $\beta = 0.0899, p = 0.0724$ ), but was significantly negatively predictive of IU, controlling for optimism ( $\beta = -0.2129, p < 0.001$ ), which was in turn significantly negatively predictive of perception of uncertain events, controlling for POPS and optimism ( $\beta = -0.2751, p < 0.001$ ). The direct effect of POPS on perception of uncertain events was also significant ( $\beta = 0.1463, p < 0.01$ ). Thus, the simplified model excluding optimism entirely, wherein IU partially mediated the positive effect of POPS on perception of uncertain events, with an indirect effect of 0.0527, 95% CI [0.0234, 0.0889]. This relationship is displayed in Figure 2.

[FIGURE 2 HERE]

A question remained as to whether resilience or self-efficacy, rather than optimism, better explained people's perceptions of uncertainty. In other words, it is possible that people's perceptions of their own ability to deal with negative outcomes, rather than their expectation of positive outcomes, drives their perceptions of uncertain situations. Indeed, resilience (measured by BRS) mediated the negative effect of ACEs on perceptions of uncertain events, with an indirect effect of -0.0565, 95% CI [-0.0943, -0.0276]. This effect was stronger than the overall indirect effect for a serial mediation model including both BRS and IU as mediators, -0.0151, though this effect was still significant, 95% CI [-0.0303, -0.0051]. Similarly, general self-efficacy (measured by NGSE) completely mediated the negative effect of ACEs on perceptions of uncertain events, with an indirect effect of -0.1300, 95% CI [-

0.2238, -0.0415]. The serial mediation model including both NGSE and IU as mediators was not significant.

Additionally, BRS partially mediated the positive effect of POPS on perceptions of uncertain events, with an indirect effect of 0.0594, 95% CI [0.0286, 0.0962], and NGSE completely mediated the positive effect of POPS on perceptions of uncertain events, with an indirect effect of 0.1752, 95% CI [0.0830, 0.2644]. Again, the serial mediation model including both BRS and IU was smaller but significant nonetheless, with an indirect effect of 0.0153, 95% CI [0.0049, 0.0303], and the serial mediation model including both NGSE and IU was not significant.

### Discussion

The results of the first study partially supported of Hypotheses A and B, particularly that people with more adverse childhood experiences had a higher intolerance for uncertainty and therefore perceived uncertain events more negatively, and conversely, that people with more positive childhood experiences had a lower intolerance for uncertainty and therefore perceived uncertain events more positively. Although optimism and pessimism were not found to play a role in this relationship in the present study, there was support for the idea that past experiences can influence people's expectations of their ability to effect positive outcomes and deal with negative outcomes generally, measured self-efficacy and resilience, respectively.

### Limitations

The young age of most of the participants in this study limits the generalizability of the findings. In particular, since the majority of the participants

were 18 years old, many were likely to have still been living with their parents or caregivers when they took the study. Thus, the effects of positive and negative childhood experiences, could have been based on immediate, rather than long-term, past experiences. This study did not make clear whether people who are farther removed from such experiences would be impacted by them in the same way.

The lack of significance of optimism and pessimism playing a role in the serial mediation models, and the finding that resilience and self-efficacy were significant mediators in the relationships between positive and negative long-term experiences and perceptions of uncertain events also raises questions regarding the effect of expectations of positive outcomes rather than a perception of one's own ability to cope with negative outcomes. Specifically, these results would suggest that it might not be people's expectations of positive outcomes that lead them to be less intolerant of uncertainty and to perceive uncertain situations more positively. Rather, they suggest that it might be that people with positive childhood experiences are more confident in their own abilities to deal with and recover from negative outcomes to uncertain situations, and therefore perceive such situations more positively than those with more negative childhood experiences do. In the forthcoming studies, the respective effects of optimism, self-efficacy, and resilience on reactions to uncertainty are probed further.

## Study 2

Study 2 consisted of two parts and included both correlational and experimental elements. The first part, which was correlational, aimed to further test Hypotheses A and B, albeit with some improvements based on the limitations of Study 1. Specifically, a more representative sample with more variance in age was recruited, using an extra feature of Prolific. This ensured that the “long-term” experiences were truly long-term, as the participants were farther removed from their childhoods.

The second part of Study 2, which was experimental, aimed to test Hypothesis C, that optimism training will lead to a more positive emotional reaction to uncertain events and thus promote an under-sensitivity and increased approach to risk. The concept of “learned optimism” holds that an optimistic explanatory style is not determined solely, or even primarily, by genetics, but rather by experiences (Seligman, 2006). Although these experiences may be more impactful if they occur over prolonged periods of time, much as “learned helplessness” contributes to depression (Maier & Seligman, 1976), more recent research in the field of positive psychology has found that optimism can indeed be taught. One strategy for teaching optimism, which was employed in Study 2, is the Best Possible Self task (Peters et al., 2010). This exercise, described in more detail in a forthcoming section, was used to manipulate optimism in order to assess whether those who were more optimistic would react to the uncertain events more positively. Additionally, Study 2 utilized a gambling task adapted from that used by Ellsberg (1961) in order to assess the effect of optimism on decision making and risk taking in an uncertain situation.

## Method

### Participants

For the first part of Study 2, participants included 495 American adults (48.3 percent cisgender female, 44.2 percent cisgender male) recruited through the online research platform Prolific. Ethnically, the participants were 65.3 percent white, 12.3 percent Black/African American, 7.9 percent Asian, 4.0 percent Hispanic/Latinx. The age distribution was improved from Study 1, with the mean age being 44 and the median 42. Most analyses include all of the participants. However, analyses related to the gambling task refer to only those who also participated in the second part of Study 2. These participants included 245 American adults (45.7% cisgender male, 46.1% cisgender women). These participants were 67.3% white, 11.0% Black/African American, 9.4% Asian, and 3.3% Hispanic/Latinx. The mean age of the participants who returned for the second part was 43.51 and the median age was 42.

### Materials

Intolerance of Uncertainty Scale. For Study 2, Cronbach's  $\alpha = 0.96$ .

Philadelphia Adverse Childhood Experiences Scale. This scale provides a count of the number of events experienced, and these items are not necessarily correlated with one another.

Perceptions of Parents Scale. For Study 2, Cronbach's  $\alpha = 0.74$ .

Perception of Uncertain Events. For Study 2, this scale was expanded to include six additional uncertain events in an effort to include events that were more emotionally neutral as well as some that may have objective emotional valence.

Participants were asked to rate the emotional tone of 14 uncertain events on a scale from one (“totally negatively”) to seven (“totally positively”). For Study 2, these events were: A blind date, the first day of school, the birth of a new sibling, a job interview, a pop quiz, a game of Bingo, a swim in the ocean, a haunted house, the COVID-19 pandemic, a terrorist attack, a trip to a foreign country for the first time, an economic recession, a war, and an undiagnosed illness. For Study 2, the average score yielded improved internal consistency,  $\alpha = 0.73$ . As described in the prior section, a principal components analysis resulted in the use of only the first day of school, a blind date, a job interview, the birth of a new sibling, a game of Bingo, and a pop quiz. This revised scale yielded similar internal consistency,  $\alpha = 0.718$ .

Brief Resilience Scale. For Study 2, Cronbach’s  $\alpha = 0.92$ .

Life Orientation Test – Revised. For the present study, Cronbach’s  $\alpha = 0.86$  for the optimism subscale and  $\alpha = 0.86$  for the pessimism subscale.

General Self-Efficacy Scale. For the present study, Cronbach’s  $\alpha = 0.94$ .

Positive and Negative Affect Schedule. The PANAS (Watson, Clark, & Tellegen, 1988) is a 20-item scale consisting of 10 positive affect items (e.g., interested, excited) and 10 negative affect items (e.g., guilty, scared). For each item, participants are asked to rate the extent to which they have experienced that emotion during the past week on a scale from one (“very slightly or not at all”) to five (“very much”). The PANAS has been found to be a reliable and valid measure of positive and negative affect in both clinical and non-clinical samples (Crawford & Henry, 2004). For the present study, Cronbach’s  $\alpha = 0.93$  for the positive affect items and Cronbach’s  $\alpha = 0.93$  for the negative affect items.

## Procedure

For the second study, a community sample of 495 participants was asked to respond to the ACEs Scale, the POPS, the LOT-R, the NGSE, the BRS, and the PANAS. After completing the questionnaires, participants were randomly split into two training groups. The first group completed a 15-minute optimism task. This task is entitled the “Best Possible Self” task. This task is a commonly used positive psychology intervention and has been found to raise and maintain positive affect (Sheldon & Lyubomirsky, 2006; Renner et al., 2014), increase optimism (Meevissen, Peters, & Alberts, 2011), and increase positive expectations for the future, linked closely to optimism (Peters et al., 2010). For five minutes, participants were instructed to think about best possible life in one year, focusing on the experiences that they will have had and the events that will have happened to them. Then, they were instructed to write down their thoughts, feelings, and details of their future self as specifically as possible for ten minutes. Participants in the second group completed a control task in which they were asked to write about a walk in nature for 15 minutes. They were then thanked for their participation, given a list of resources that may assist them with any emotional distress related to recalling the adverse childhood experiences asked about at the beginning of the study, and given information about the upcoming steps in the study. For each of the next eight days (days two through nine), participants in both groups were asked to spend five minutes visualizing what they wrote about during the first part of the study (either their best possible self or the nature walk). On the tenth day, participants were asked once again to visualize what they wrote about for five minutes. Then, participants repeated the LOT-R, the

PANAS, the NGSE, and the BRS. Then, the participants were asked to complete a risk prediction task similar to that described by Ellsberg (1961). They were told that there are 75 black balls and 25 red balls in an urn. Participants were asked to guess what the chances are that at least one out of the next five balls pulled from the urn will be a red ball (i.e., a winning ball). They were then asked to decide whether they would like to take that chance: Five balls will be drawn. If at least one is red, they will gain ten dollars, but if none are red, they will lose ten dollars. Additionally, participants were asked to rate the uncertain events with regard to their negativity or positivity. After completing the task, the participants were debriefed as to the full purpose of the study. They were thanked and paid for their participation.

#### Analyses

Descriptive statistics were calculated, as well as bivariate correlations, t-tests, and mediation models. All analyses were conducted using SPSS Version 26. Serial mediation was conducted using PROCESS Version 4.1. All of the mediation and serial mediation models use standardized z-scores for each variable. A principal components analysis was conducted post hoc, resulting in the use of only the six items of the perceptions of uncertain events scale listed above.

### Results

#### Part 1 Results

In a serial mediation analysis using SPSS Version 26 PROCESS, number of ACEs significantly negatively predicted optimism ( $\beta = -0.3466, p < 0.001$ ), which in turn negatively predicted IU controlling for the effect of ACEs ( $\beta = -0.5413, p <$

0.001). IU subsequently negatively predicted perceptions of uncertain circumstances, controlling for the effects of ACEs and optimism ( $\beta = -0.1865, p < 0.001$ ). This relationship is displayed in Figure 3. Additionally, POPS significantly positively predicted optimism ( $\beta = 0.3995, p < 0.001$ ), which in turn negatively predicted IU, controlling for the effect of POPS ( $\beta = -0.5471, p < 0.001$ ). IU subsequently negatively predicted perceptions of uncertain circumstances, controlling for the effects of POPS and optimism ( $\beta = -0.1874, p < 0.001$ ). This relationship is displayed in Figure 4.

[FIGURE 3 HERE]

[FIGURE 4 HERE]

Notably, the same models were replicated substituting first NGSE and then BRS for LOTR as the first mediator, finding significant effects. Specifically, the indirect effect of ACEs on perceptions of uncertain events, mediated by NGSE and IU, was -0.0244, 95% CI [-0.0397, -0.0124], and the indirect effect of POPS on perceptions of uncertain events, mediated by NGSE and IU, was 0.0375, 95% CI [0.0203, 0.0578]. The indirect effect of ACEs on perceptions of uncertain events, mediated by BRS and IU, was -0.0247, 95% CI [-0.0459, -0.0089], and the indirect effect of POPS on perceptions of uncertain events, mediated by BRS and IU, was 0.0351, 95% CI [0.0149, 0.0613].

In comparing the  $R^2$  values of these serial mediation models, no model was clearly better than the others. I therefore ran a series of model comparisons of nested linear models. The best model included optimism, resilience, and intolerance of uncertainty as predictors of perceptions of uncertain events, but not self-efficacy. The

same results were found using backward linear regression as well as parallel mediation (using optimism, resilience, and self-efficacy to mediate the effects of positive and negative childhood experiences on intolerance of uncertainty). Therefore, final models were hypothesized and supported post hoc, wherein ACEs, using the parallel mediators of optimism and resilience, predicts higher intolerance of uncertainty (total indirect effect = 0.1908, 95% CI [0.1290, 0.2554]), which subsequently predicts negative perceptions of the six uncertain events, controlling for the effects of ACEs, optimism, and resilience ( $\beta = -0.109, p < 0.05$ ); and POPS, using the parallel mediators of optimism and resilience, predicts lower intolerance of uncertainty (total indirect effect = -0.2489, 95% CI [-0.3173, -0.1790]), which subsequently predicts positive perceptions of the six uncertain events, controlling for the effects of POPS, optimism, and resilience ( $\beta = -0.118, p < 0.05$ ). These relationships are displayed in Figure 5 and Figure 6.

[FIGURE 5 HERE]

[FIGURE 6 HERE]

## Part 2 Results

Comparison of the experimental group participants' LOT-R scores during Part 1 and Part 2, as well as the two groups' LOT-R scores in Part 2 demonstrated that the experimental manipulation was not successful. Specifically, the participants in the experimental group scored significantly higher on the LOT-R during Part 1 than Part 2 ( $t(111) = 3.59, p < 0.001$ ). Additionally, during Part 2, there was no difference in LOT-R scores between the experimental and control groups ( $t(233) = -0.07, p = 0.94$ ). Therefore, it was not possible to discern whether there were any effects of the

experimental manipulation. However, logistic regression revealed that participants who reported a more positive affect during Part 2 were more likely than those with a more negative affect to take the chance during the gambling task, that is, to approach rather than avoid uncertainty ( $\beta = 0.043, p < 0.01$ ). This was perhaps because a more positive affect during Part 2 was significantly predictive of reporting feeling positively about the gambling task ( $\beta = 0.021, p < 0.01$ ). However, it was not predictive of the perceived odds of picking a winning ball, suggesting that people who felt more positively in general felt more positively about the task and were therefore more willing to take a risk, regardless of what they perceived their chances of winning to be. Importantly, positive affect during Part 2 was predicted by higher LOT-R scores during Part 1 ( $\beta = 0.626, p < 0.001$ ).

### Discussion

The results of the present study expanded upon those of Study 1. First, the hypotheses that positive and negative childhood experiences would predict positive and negative perceptions of uncertain events was again supported, this time through a serial mediation model which included optimism/pessimism and intolerance of uncertainty. Additionally, a subsequent model included resilience as a parallel mediator to optimism/pessimism, suggesting that expectations of both external outcomes and internal abilities to cope with such outcomes play a role in affective reactions to uncertainty. Finally, Study 2 also provides some support for the hypothesis that more optimistic people who feel more positively during a risk-taking task might be more likely to take a risk under uncertain situations, such as the red

ball/black ball paradigm described above. However, this result was correlational, as the experimental manipulation of optimism was not successful.

#### Limitations

A pilot study of the Best Possible Self task found that undergraduate students were significantly more optimistic after they completed the task once than they were at baseline. It was therefore assumed that this effect would be amplified after ten days of visualization, since previous tests of the Best Possible Self task assigned participants to complete the visualization multiple times, rather than just once. However, it seems that participants likely did not complete the visualization reliably every day. Additionally, even though participants were asked to visualize what they wrote about (either their Best Possible Self or a nature walk) immediately prior to the last part of the study, they did not complete the entire writing task on the final day, possibly weakening the effect of the recent prime. Thus, I decided to complete Study 3 in one sitting, assigning those in the experimental group to complete the mindfulness meditation exercise only once, immediately prior to finishing the second part of the study.

## Study 3

As with Study 2, Study 3 also included a correlational and an experimental aspect. The first part, which was correlational, aimed to replicate the effects found in Study 2, which supported Hypotheses A and B. As in Study 2, Study 3 used a sample of participants with an age distribution more representative of the American population. The same expanded set of uncertain events that was used in Study 2 was also used in Study 3, but was subsequently reduced following the principal components analysis described previously. A measure of adult attachment style was also added to the first part of Study 3. In the previous two studies, the measure of positive perceptions of parents was used to predict positive perceptions of uncertain events. The composite POPS score consists of measures of parental warmth, involvement, and autonomy support. Whereas the first two factors, warmth and involvement, likely reflect positive memories which would lead the participant to expect future positive outcomes, the third factor, autonomy support, is closely linked to the “secure base” concept in attachment theory. If a parent is supportive of their child’s autonomy, then the child learns to be independent and explore the world, confident that they can turn to their parent in times of need (Soenens et al., 2007). Thus, it is possible that the POPS measure consists of both positive long-term experiences and secure attachment. Therefore, a measure of adult attachment was used to assess the effect of attachment specifically on emotional reactions to uncertain situations, separate from positive long-term experiences in general.

The second part of Study 3, which was experimental, aimed to test Hypothesis D, that mindfulness training will lead to a more neutral emotional reaction (neither

positive nor negative) to uncertain events. As described previously, mindfulness training is commonly used to help ease anxiety by helping people to focus their attention on the present moment and to accept reality as it is, recognizing that the world is always changing (Bishop et al., 2004). The mindfulness exercise used in Study 3 came from the online application Headspace, which has been assessed as very high in quality by experts in mindfulness meditation (Mani et al., 2015). The ten-minute mindfulness meditation exercise provided by Headspace has been found to increase mindfulness and decrease depression when used every day for 10 days, and to also increase mental health and resilience when used every day for 30 days (Flett et al., 2019). In Study 3, the exercise was completed only once, however. The decision was made for participants to complete the entire study in one sitting following the failure of the optimism manipulation in Study 2, which may have occurred because participants did not actually complete the exercise every day as requested. Like the optimism manipulation, the mindfulness manipulation had also been found to be successful after one exercise in a pilot study.

### Method

#### Participants

For Study 3, participants included 401 American adults (48.4 percent cisgender female, 45.1 percent cisgender male) recruited through the online research platform Prolific. Ethnically, the participants were 73.1 percent white, 12.2 percent Black/African American, 5.9 percent Hispanic/Latinx, 5.2 percent Asian. The age

distribution was similar to that of Study 2, with the mean age being 45.2 and the median 46.

#### Materials

Intolerance of Uncertainty Scale. For Study 3, Cronbach's  $\alpha = 0.97$ .

Philadelphia Adverse Childhood Experiences Scale. This scale provides a count of the number of events experienced, and these items are not necessarily correlated with one another.

Perceptions of Parents Scale. For Study 3, Cronbach's  $\alpha = 0.74$ .

Attachment. The present study also included a measure of attachment, given the close link between being securely attached and being comfortable with uncertainty. Previous research has found that individuals with secure attachment styles, stemming from positive childhood experiences with one's parents, are keener to explore novel situations than those with insecure attachment styles (Green & Campbell, 2000). Thus, a measure of adult attachment style was included in order to examine whether secure and insecure attachment were predictive of optimism, intolerance of uncertainty, and affective reactions to uncertain situations. The Experiences in Close Relationships – Revised scale (ECR-R) is a self-report measure which assesses stable anxious and avoidant romantic attachment styles. The short version of the scale, used presently, includes 12 items related to the respondent's experiences and behaviors in close relationships, which are rated on a Likert scale from one ("strongly disagree") to seven ("strongly agree"). Examples of items related to the anxious attachment style include "I need a lot of reassurance that I am loved by my partner" and "My desire to be very close sometimes scares people away."

Examples of items related to the avoidant attachment style include “I try to avoid getting too close to my partner” and “I am nervous when my partner gets too close to me.” For this study, Cronbach’s  $\alpha = 0.83$  for the avoidance subscale, and Cronbach’s  $\alpha = 0.84$  for the anxious subscale.

Perception of Uncertain Events. For Study 3, this scale were asked to rate the emotional tone of 14 uncertain events on a scale from one (“totally negatively”) to seven (“totally positively”). For Study 2, these events were: A blind date, the first day of school, the birth of a new sibling, a job interview, a pop quiz, a game of Bingo, a swim in the ocean, a haunted house, the COVID-19 pandemic, a terrorist attack, a trip to a foreign country for the first time, an economic recession, a war, and an undiagnosed illness. For Study 3, the average score yielded moderate internal consistency,  $\alpha = 0.69$ . As described previously, a principal components analysis resulted in the use of only the first day of school, a blind date, a job interview, the birth of a new sibling, a game of Bingo, and a pop quiz. This revised scale yielded similar internal consistency,  $\alpha = 0.70$ .

Brief Resilience Scale. For Study 3, Cronbach’s  $\alpha = 0.94$ .

Life Orientation Test – Revised. For the present study, Cronbach’s  $\alpha = 0.88$  for the optimism subscale and  $\alpha = 0.90$  for the pessimism subscale.

General Self-Efficacy Scale. For the present study, Cronbach’s  $\alpha = 0.95$ .

Activation-Deactivation Adjective Checklist. The AD-ACL (Thayer, 1978) is a 20-item scale consisting of a series of adjectives which describe four activation states: General activation (e.g., vigorous), deactivation-sleep (e.g., drowsy), high activation (e.g., jittery), and general deactivation (e.g., placid). For each item,

participants are asked to rate the extent to which that word describes their feelings at the present moment as “Definitely feel” (4), “Feel slightly” (3), “Cannot decide” (2), or “Definitely do not feel” (1). For the present study, Cronbach’s  $\alpha = 0.88$  for general activation, Cronbach’s  $\alpha = 0.89$  for deactivation-sleep, Cronbach’s  $\alpha = .72$  for high activation, and Cronbach’s  $\alpha = .77$  for general deactivation.

### Procedure

For the third study, a community sample of 401 participants was asked to respond to the ACEs Scale, the POPS, the LOT-R, the NGSE, and the BRS. For each of the ACEs that they had experienced, the participants were also asked to indicate how many years it had been since each experience. After completing the questionnaires, participants were randomly split into two training groups. The first group completed a 10-minute mindfulness meditation exercise. Participants listened to a recording from the mindfulness app Headspace. In order to ensure their engagement, participants were asked to tap the spacebar any time they noticed their mind wandering off, as a key aspect of mindfulness meditation is to nonjudgmentally notice when one is distracted and to refocus on the exercise. Participants in the second group completed a control task in which they were asked to write about a walk in nature for 10 minutes. After completing these exercises, the participants’ arousal was assessed using the AD-ACL and they were then asked to rate each of the uncertain situations. They were then thanked for their participation, given a list of resources that may assist with any emotional distress related to recalling the adverse childhood experiences asked about at the beginning of the study, debriefed as to the full purpose of the study, and paid for their participation.

## Analyses

Descriptive statistics were calculated, as well as bivariate correlations, t-tests, and mediation models. All analyses were conducted using SPSS Version 26. Serial mediation and moderation models were conducted using PROCESS Version 4.1. All of the mediation and serial mediation models use standardized z-scores for each variable.

## Results

### Mediation Models

In a serial mediation analysis using SPSS Version 26 PROCESS, number of ACEs significantly negatively predicted optimism ( $\beta = -0.2413, p < 0.001$ ), which in turn negatively predicted IU controlling for the effect of ACEs ( $\beta = -0.6126, p < 0.001$ ). IU subsequently negatively predicted perceptions of uncertain circumstances, controlling for the effects of ACEs and optimism ( $\beta = -0.1856, p < 0.01$ ). This relationship is displayed in Figure 7. Additionally, POPS significantly positively predicted optimism ( $\beta = 0.3060, p < 0.001$ ), which in turn negatively predicted IU, controlling for the effect of POPS ( $\beta = -0.6341, p < 0.001$ ). IU subsequently negatively predicted perceptions of uncertain circumstances, controlling for the effects of POPS and optimism ( $\beta = -0.1960, p < 0.001$ ). This relationship is displayed in Figure 8.

[FIGURE 7 HERE]

[FIGURE 8 HERE]

The same models were replicated substituting first NGSE and then BRS for LOTR as the first mediator, finding significant effects. Specifically, the indirect effect of ACEs on perceptions of uncertain events, mediated by NGSE and IU, was -0.0160, 95% CI [-0.0330, -0.0040], and the indirect effect of POPS on perceptions of uncertain events, mediated by NGSE and IU, was 0.0278, 95% CI [0.0114, 0.0492]. The indirect effect of ACEs on perceptions of uncertain events, mediated by BRS and IU, was -0.0205, 95% CI [-0.0417, -0.0061], and the indirect effect of POPS on perceptions of uncertain events, mediated by BRS and IU, was 0.0254, 95% CI [0.0091, 0.0481].

Given the results of the model comparisons described in the prior section, final models were hypothesized and supported post hoc, wherein ACEs, using the parallel mediators of optimism and resilience, predicts higher intolerance of uncertainty (total indirect effect = 0.1532, 95% CI [0.0892, 0.2245]), which subsequently predicts negative perceptions of the six uncertain events, controlling for the effects of ACEs, optimism, and resilience ( $\beta = -0.143$ ,  $p < 0.05$ ); and POPS, using the parallel mediators of optimism and resilience, predicts lower intolerance of uncertainty (total indirect effect = -0.1989, 95% CI [-0.2106, -0.0846]), which subsequently predicts positive perceptions of the six uncertain events, controlling for the effects of POPS, optimism, and resilience ( $\beta = -0.154$ ,  $p < 0.01$ ). These relationships are displayed in Figure 9 and Figure 10.

[FIGURE 9 HERE]

[FIGURE 10 HERE]

The same model was also run substituting anxious attachment style as the independent variable. This analysis found that anxious attachment using the parallel mediators of optimism and resilience, predicts higher intolerance of uncertainty (total indirect effect = 0.2868, 95% CI [0.2124, 0.3701]), which subsequently predicts negative perceptions of the six uncertain events, controlling for the effects of anxious attachment, optimism, and resilience ( $\beta = -0.168, p < 0.01$ ). This relationship is displayed in Figure 11. Similarly, serial mediation analysis also found that avoidant attachment using the parallel mediators of optimism and resilience, predicts higher intolerance of uncertainty (total indirect effect = 0.2107, 95% CI [0.1498, 0.2742]), which subsequently predicts negative perceptions of the six uncertain events, controlling for the effects of avoidant attachment, optimism, and resilience ( $\beta = -0.146, p < 0.05$ ). This relationship is displayed in Figure 12. These results are unsurprising, given the significant positive correlations between avoidant attachment and ACEs ( $r = 0.206, p < 0.001$ ) and between anxious attachment and ACEs ( $r = 0.252, p < 0.001$ ), as well as the significant negative correlations between avoidant attachment and POPS ( $r = -0.259, p < 0.001$ ) and between anxious attachment and POPS ( $r = -0.223, p < 0.001$ ).

[FIGURE 11 HERE]

[FIGURE 12 HERE]

#### Mindfulness Meditation Training Effects

With regard to the AD-ACL factors, people in the experimental group ( $n = 201$ ) scored significantly lower than those in the control group on general activation ( $t(398) = -6.728, p < 0.001$ ). They also scored significantly higher on deactivation-

sleep ( $t(398) = 7.883, p < 0.001$ ) and on general deactivation ( $t(398) = 5.144, p < 0.001$ ), demonstrating that those who completed the mindfulness meditation exercise were significantly less aroused than those who completed the nature walk activity. There were no significant group differences on the high activation factor, though the scores for both groups were markedly lower than scores on the other factors, suggesting that neither group felt particularly tense or jittery. As expected, the two groups did not differ overall in their perception of the uncertain events. However, those in the experimental group rated each of the six uncertain situations significantly closer to the midpoint of the scale (i.e., more neutral), meaning that the absolute values of the difference between the ratings for each uncertain event and the midpoint was significantly smaller for the experimental group than for the control group. This indicates that those who completed the mindfulness meditation exercise perceived the uncertain events not more positively or negatively, but rather more neutrally ( $t(398) = 2.379, p < 0.05$ ). There were no significant interactions between any of the different activation/deactivation scores and the mindfulness training on the neutrality score.

### Discussion

The mediation results of Study 3 replicate and expand upon the results of Studies 1 and 2. First, the serial mediation models add support for the hypotheses that histories of negative and positive outcomes predict expectation of negative and positive outcomes (as measured by pessimism and optimism) as well as expectation of one's ability to deal with potential negative outcomes (as measured by resilience), which in turn predict intolerance or tolerance of uncertainty, subsequently leading people to perceive uncertain situations as negative or positive. Additional serial

mediation models tested in Study 3 demonstrate the connections between these positive and negative experiences as measured by perceptions of one's parents as warm, involved, and supportive of one's autonomy, and by adverse childhood experiences, and attachment style. Specifically, insecure (both avoidant and anxious) attachment style as an adult was significantly positively associated with higher numbers of adverse childhood experiences and significantly negatively associated with perceptions of parents. In turn, insecure attachment (whether avoidant or anxious) could be substituted as the independent variable in the mediation models, with similar results.

Study 3 also demonstrated, unlike Studies 1 and 2, that although intolerance of uncertainty may be a personality trait predicted by early childhood experiences, perception of uncertain situations as negative (or indeed, positive) may not be immutable. The second part of Study 3 experimentally examined the effect of mindfulness meditation training on perceptions of uncertain events, finding that those who participated in a mindfulness meditation exercise perceived the uncertain events more neutrally than those who participated in the somewhat relaxing exercise of writing about a walk in nature, but that did not include the particular tenets of mindfulness which emphasize non-attachment to outcomes, or acceptance of uncertainty. Thus, this experiment suggests that not only can people's perceptions of uncertainty be changed, but that such change may not simply depend on reducing anxiety or improving one's mood through general relaxation exercises, but rather on learning to disconnect oneself to the expected outcomes of uncertain situations which,

based on the serial mediation models, are likely the foundation of intolerance of uncertainty.

#### Limitations

Study 3 improved upon Studies 1 and 2 but was nevertheless limited in the conclusions it allows. First, although this study examined whether the effects of past experiences on perceptions of uncertain events could indeed be altered, this study did not incorporate any immediate past negative outcomes. Priming individuals with immediate past negative outcomes, for instance by losing a game during an experiment, would apply the present research on intolerance of uncertainty and past experiences to the synapse model (Higgins, 1989). In an experiment which includes such a manipulation, one would expect that people primed with immediate past negative experiences would perceive uncertain situations more negatively when measured immediately after such an experience, but that long-term histories would take precedence when perceptions of uncertain situations were measured later.

## General Discussion

Consider the case of Aaron, described in the introductory section. With a childhood history of negative experiences, Aaron likely expects uncertain situations to have negative outcomes – he is low in optimism and high in pessimism. He may also expect that he will not be able to cope with those negative outcomes – he is low in resilience, as well. These expectations about himself and the world lead him to have a high intolerance of uncertainty. When faced with an uncertain situation that is personally important, whether that is the first day of a new job or a first date, Aaron becomes anxious because he believes that the situation will end badly and that he will not be able to recover from the expected rejection. Similarly, he will never take a risk regarding a Boston sports team, because uncertainty regarding the success or failure of a team with which he identifies brings fear and dread. Aaron does not fear all uncertainty, however. Indeed, he derives pleasure from uncertain situations – gambling – when he does not find the situation personally salient, thus demonstrating that it is not the uncertainty in and of itself that Aaron finds aversive, but rather the expectation of negative outcomes about which he cares, that is, whose valence for him is highly negative.

The evidence from all three studies described presently support this reconceptualization of intolerance of uncertainty as being driven not by uncertainty as such but rather by expectation of negative outcomes to uncertain situations and an inability to adequately cope with those outcomes, and of tolerance or even embrace of uncertainty being driven by both expectation of positive outcomes and belief that one will be able to recover from negative outcomes if they arise. Across all three studies, I

found a significant effect of positive and negative childhood experiences, which were significantly associated with secure and insecure attachment, on positive and negative perceptions of uncertain situations. Intolerance of uncertainty and resilience played a role in explaining this relationship in all cases. In the second two studies, expectation of positive and negative outcomes (i.e., optimism and pessimism) as well as expectation of one's ability to cope with negative outcomes (i.e., resilience) also played a significant role in explaining both the relationships between positive and negative experiences and intolerance of uncertainty and between positive and negative experiences and perceptions uncertain situations.

The role of expectations is key to the overarching theory I explored in the present research. Consistent with the availability heuristic (Tversky & Kahneman, 1973), participants in the first two studies who experienced each adverse childhood experience were found to estimate that such experiences were more common than those who did not experience that adversity, and people who experienced more adversities were found to, on average, predict higher frequencies of each type of adverse childhood experience. Similarly, people who had more positive perceptions of their parents' warmth, involvement, and autonomy support estimated that the frequency of Americans having positive perceptions of their own parents was higher, compared with those who had negative perceptions of their parents. These estimation questions were not included in the third study; questions about how recently each adverse childhood experience had last occurred were used in their stead.

Interestingly, participants who experienced more adversities did not estimate a lower likelihood of picking a winning ball in Study 2, nor did people with more

positive perceptions of their parents estimate a higher likelihood of the same. This contrasts with previous findings showing that immediate past positive outcomes result in an under-sensitivity to risk, and vice versa (Erev et al., 2020). This contrast could be attributed to a number of explanations, one of which is that participants had recently been primed with positive images. Even though only one group imagined their “best possible self” for five minutes prior to completing the gambling task, the other group imagined a nature walk for five minutes prior to completing the gambling task. In examining the participants’ written responses from the first part of the study, it is evident that the nature walk was imagined to be a pleasant experience for all. Therefore, according to the synapse model (Higgins, 1989), such recent priming would have dominated over the long-term effects of adverse childhood experiences for all participants, eliminating a possible difference in probability estimation between groups, as well as between participants with more or fewer adverse childhood experiences.

The present research makes a contribution to the broader field of the psychology of uncertainty and intolerance of uncertainty in that it offers empirical support for the reconceptualization of negative and positive affective reactions to uncertainty being driven by expectations of negative and positive outcomes which are based in past experiences. The fear of the unknown may indeed be innate (Carleton, 2016), but the present research and that reviewed in the introductory sections strongly suggest that positive childhood experiences, including secure attachment to one’s caregiver, teach people to expect positive outcomes to uncertain situations or at least believe that they are capable of coping healthily with negative outcomes which may

arise. As a result, individuals with a prior history of positive experiences may display more exploratory behaviors (Green & Campbell, 2000) and creativity (Kirrane et al., 2019) and are more open to new people and new experiences (Sternheim, 2017; Sanford et al., 1950). Many people experience adversity during childhood, however, as well as parenting styles that result in insecure attachments. These individuals learn to expect negative outcomes in uncertain situations, display more anxious behaviors in such situations and tend to be rigid in their thinking and attitudes toward those who are different from them (Berenbaum, Bredemeier, & Thompson, 2008).

The present research does not imply that there is nothing to be done about these relationships, however. Study 2 found that more optimistic people are more likely to feel positively about taking a risk in an uncertain situation, regardless of what they estimate to be their likelihood of success. Although the optimism exercise utilized in Study 2 was not effective in increasing participants' optimism, it remains probable that an effective optimism training would result in more positive attitudes toward uncertainty. This is an important direction for future research. Additionally, Study 3 found that participants' feelings toward uncertain situations could indeed be affected by a short, one-time mindfulness meditation training, which resulted in lower arousal and more neutral perceptions of uncertain events, although lower arousal and neutral perceptions of uncertain events appeared to be unrelated to one another. Future research should examine whether longer term mindfulness training can mitigate the empirically supported consequences of intolerance of uncertainty described previously, namely belief in conspiracy theories and support for authoritarian leaders (Adorno et al., 1950), in addition to clinical anxiety disorders,

which have already been found to be treated effectively using mindfulness meditation (Boettcher et al., 2014; Miller, Fletcher, & Kabat-Zinn, 1995). Notably, mindfulness meditation training has also been found to increase resilience among individuals with high numbers of adverse childhood experiences (Bethell et al., 2016), a relationship which is demonstrated in the present research to be critical to the negative perception of uncertain situations.

## Conclusion

The COVID-19 pandemic has brought about a period rife with uncertainty and anxiety, leading many to tie the two together: the former an objective descriptor of an unprecedented environment; the latter a feeling associated with it, as has been documented in numerous studies across multiple countries (United Nations, 2020). And yet, as any introductory statistics student knows, correlation does not imply causation. It is not necessarily the uncertainty in and of itself that has ushered in such distress. The presently proposed reconceptualization of intolerance of uncertainty holds that the distress may be caused by the preponderance, indeed, the increased likelihood, of negative outcomes: Sickness, death of a loved one, loss of a job, developmental stagnation of a child, etc. If in everyday life, mundane uncertainties lead those with histories of negative outcomes to expect future negativity, resulting in greater intolerance of uncertainty, then the contextual priming of negative outcomes related to COVID-19, namely in the news and on social media, should override the optimism of those with histories of positive outcomes, resulting in greater COVID-related anxiety across the board. In fact, recent studies have found that intolerance of uncertainty mediated the relationship between fear of COVID-19 and negative outcomes including depression and anxiety (Bakioğlu, Korkmaz, & Ercan, 2021), suggesting that COVID-related distress is explained not by the uncertainty of COVID, but by the intolerance thereof, which the present research links to expectations of negative outcomes and low levels of resilience. Additionally, a study conducted by Korkmaz and Güloğlu (2021) similarly found that intolerance of uncertainty was predictive of anxiety during COVID-19, but so was chronic illness, a

condition which increases the likelihood of negative outcomes related to the uncertain situation of COVID-19 (Nikoloski et al., 2021). Further, having meaning in one's life was found to protect against COVID-related distress (Korkmaz & Güloğlu, 2021), perhaps because meaning in life is associated with optimism and expectation of positive outcomes (Ho, Cheung, & Cheung, 2010), which, according to the present theory, would reduce intolerance of uncertainty and subsequent negative affect related to uncertain situations, such as COVID-19.

President Franklin Delano Roosevelt grew up privileged, but also faced a slew of negative experiences, including the death of his father when FDR was 18, and the paralysis of his legs at 39 which left him unable to walk without assistance for the rest of his life (Dallek, 2018). It was perhaps his triumph over such hardship, with the assistance of expansive resources unavailable to most, that inspired the optimism which characterized his famous Fireside Chats, during which he presented a series of policies aimed at improving the lives of Americans hit hardest by the Depression. During one of his Fireside Chats in April of 1938, FDR said, "To reach a port we must set sail. Sail, not tie at anchor. Sail, not drift." At the time when FDR uttered these words, the Great Depression had not yet ended; Europe was on the brink of war. In 2022, these circumstances are all too familiar. One might draw inspiration from his words in approaching an increasingly uncertain world and learn to look upon it with interest and exploration, if not outright optimism and hope.

## Figures

Figure 1. Study 1 Mediation Model – ACEs on Perceptions of Uncertain Situations

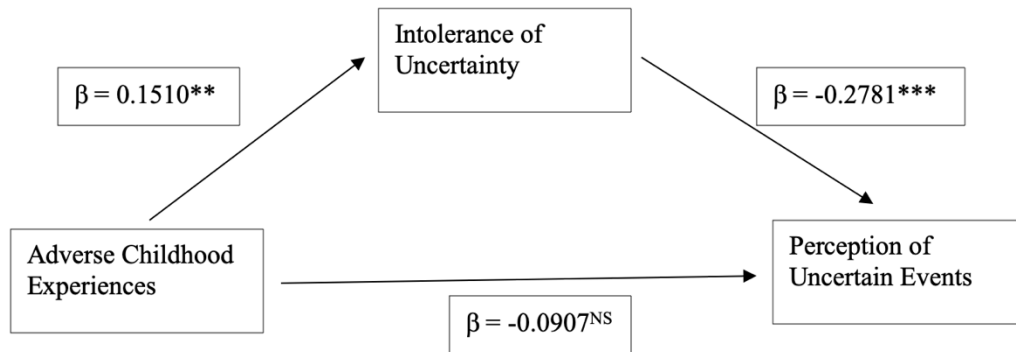


Figure 2. Study 1 Mediation Model – POPS on Perceptions of Uncertain Situations

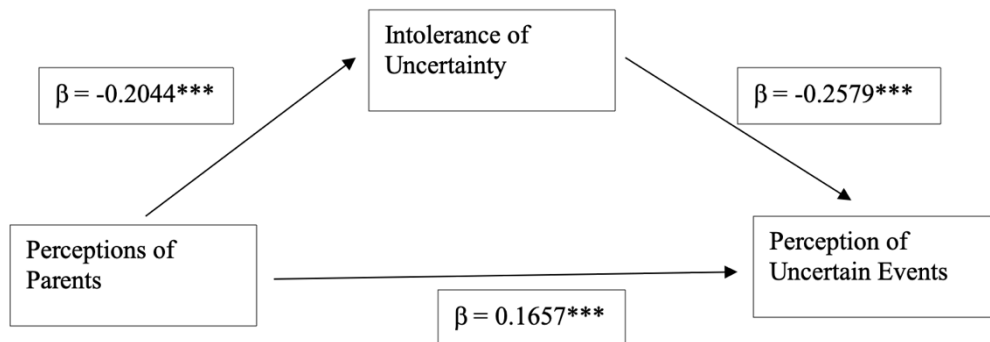


Figure 3. Study 2 Serial Mediation Model – ACEs on Perceptions of Uncertain Situations

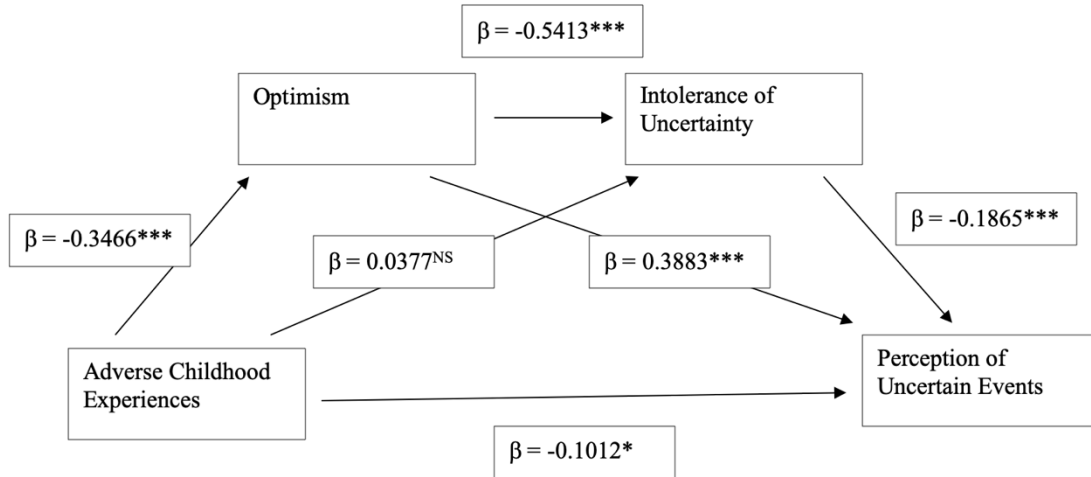


Figure 4. Study 2 Serial Mediation Model – POPS on Perceptions of Uncertain Situations

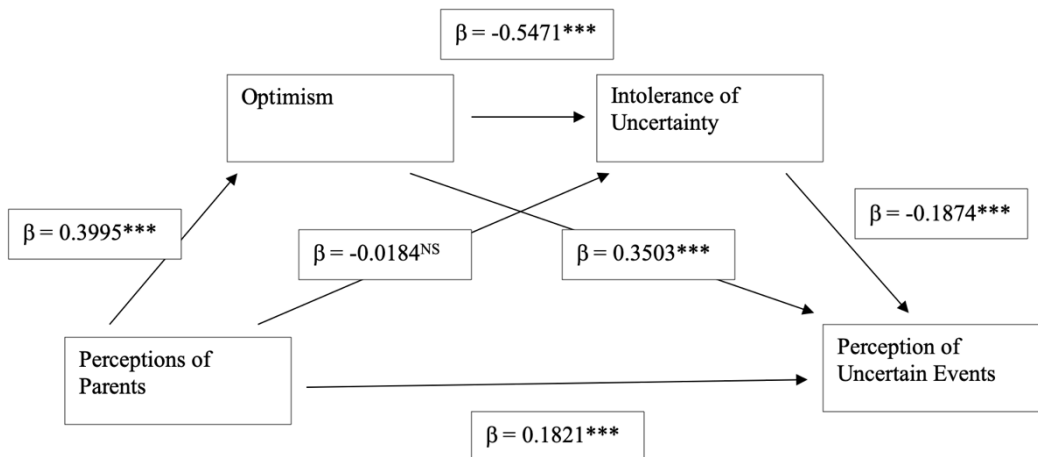


Figure 5. Study 2 Final Parallel Mediation Model – ACEs on Perceptions of Uncertain Situations

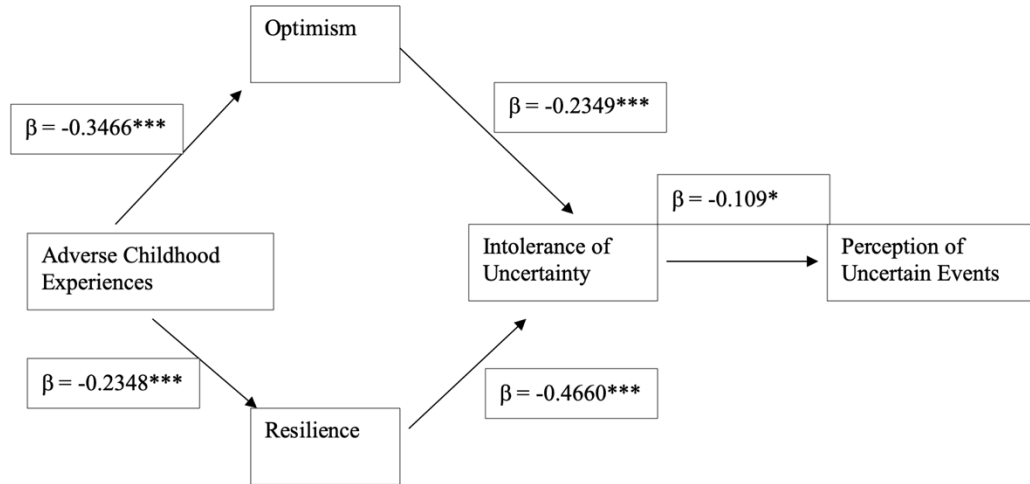


Figure 6. Study 2 Final Parallel Mediation Model – POPS on Perceptions of Uncertain Situations

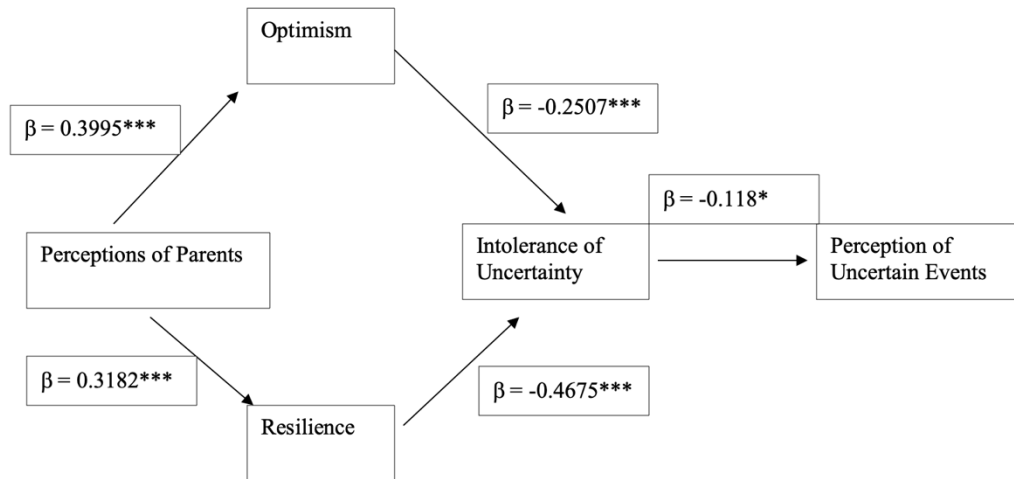


Figure 7. Study 3 Serial Mediation Model – ACEs on Perceptions of Uncertain Situations

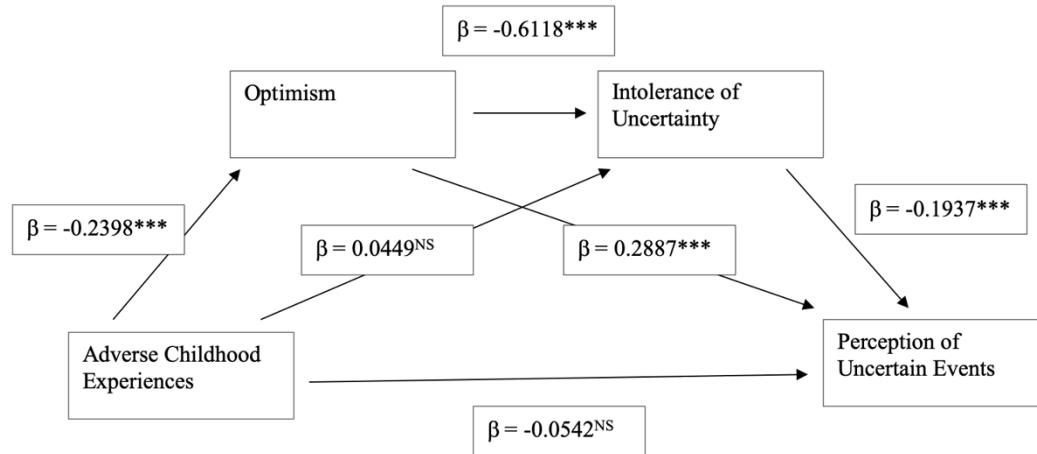


Figure 8. Study 3 Serial Mediation Model – POPS on Perceptions of Uncertain Situations

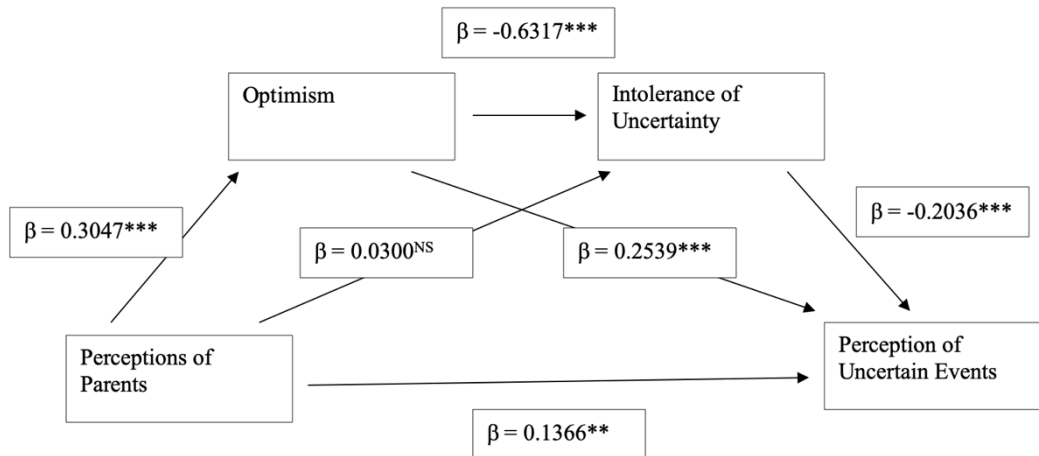


Figure 9. Study 3 Final Parallel Mediation Model – ACEs on Perceptions of Uncertain Situations

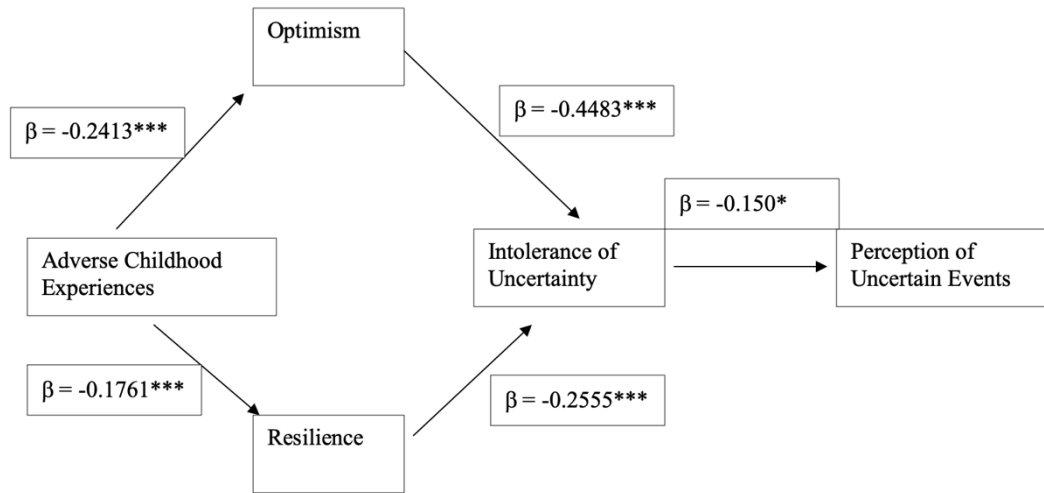


Figure 10. Study 3 Final Parallel Mediation Model – POPS on Perceptions of Uncertain Situations

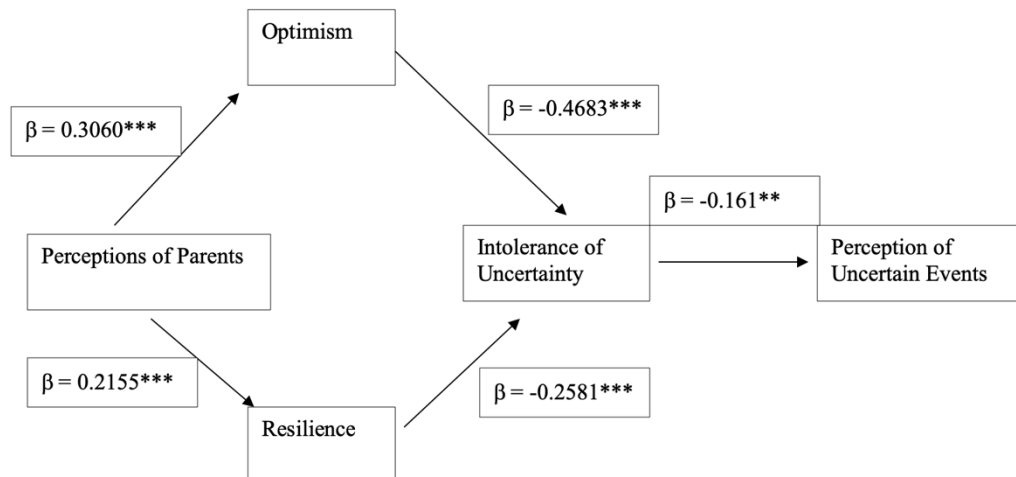


Figure 11. Anxious Attachment on Perceptions of Uncertain Situations

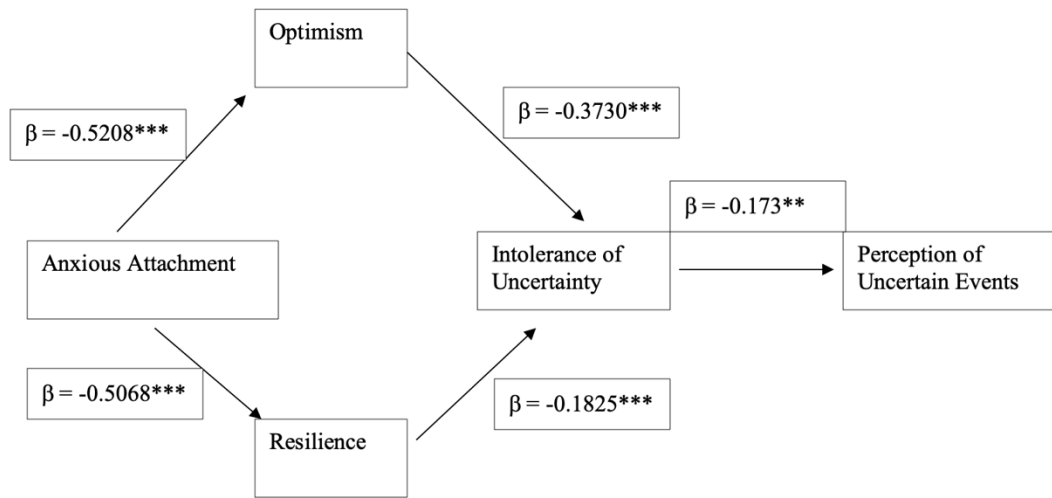
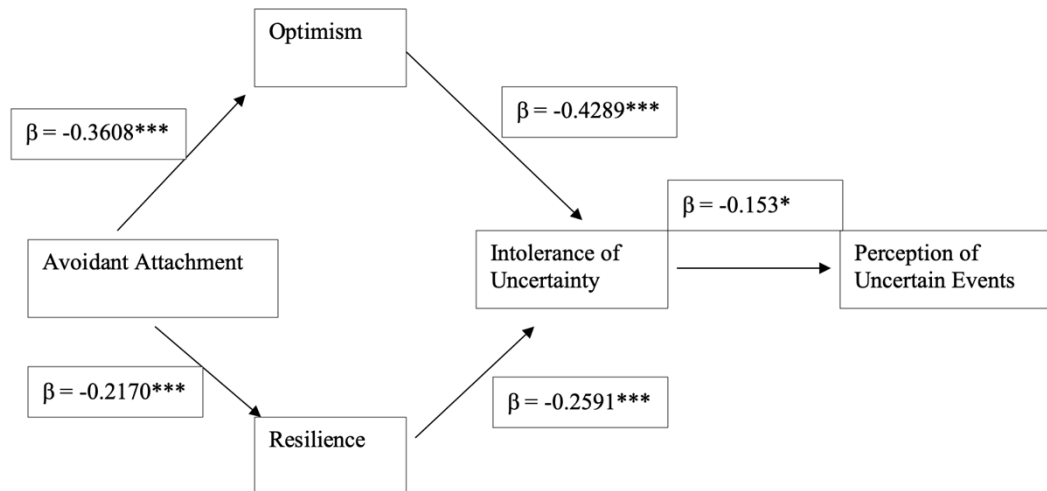


Figure 12. Anxious Attachment on Perceptions of Uncertain Situations



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